



UNIVERSITI PUTRA MALAYSIA

**AN ECONOMIC VALUATION OF SAGO FOREST HARVESTING
REGIMES**

SULAIMAN BIN HAJI HUSAINI.

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**AN ECONOMIC VALUATION OF SAGO FOREST
HARVESTING REGIMES**

By

SULAIMAN BIN HAJI HUSAINI

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

January 2006



Dedicated to:

My Mother, Hajjah Hasiah Hj Mokhtar and late Father,

Haji Husaini Hj Zahwi

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in
fulfilment of the requirement for the degree of Doctor of Philosophy

AN ECONOMIC VALUATION OF SAGO FOREST HARVESTING REGIMES

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SULAIMAN HJ HUSAINI

January 2006

Chairman: Professor Khalid Abdul Rahim, PhD

Faculty: Economics and Management

The perception that peat swamp land is a marginal land and sago is a marginal crop is an understatement. It is an understatement that omits the environmental costs and benefits associated with sago peat swamp forest management. Sago peat swamp forest serves important ecological and environmental functions and provides perpetual benefits, if managed in a sustainable manner. One of the measures for sustainability is the valuation of the resource. This study uses the disciplines of economics in order to generate the set of values. Hence the total economic valuation (TEV) approach is adopted. In order to demonstrate the TEV, the components of sago peat swamp forest to be estimated and quantified are the stumpage value, fish, domestic water, carbon sequestration and wildlife. The methods adopted in valuation of these benefits are market price, damage cost avoided and contingent valuation. The objective of the study is to estimate the TEV of sago harvesting regimes that are most efficient both financially and environmentally. The samples are the heads of the households from the villages that surround the study site. This is to ensure the samples are familiar with the study site.

The analysis is conducted in three parts. The first part is the willingness-to-pay (WTP) for the benefits provided by the Mukah Sago peat swamp forest. The analysis reveals that the determination of WTP is the income earned from the benefits. The second part is the quantification of each component of TEV used in the study. The analysis shows that the economic value is higher under sustainable option when compared with unsustainable option. The final part is the financial analysis. The financial and economic internal rates of return are calculated. The financial internal rate of return highlights only the income derived from the sago logs, the tangible asset. However, the economic rate of return aggregates all the values of the other benefits, both tangible and intangible into the income calculation.

The results are significant at both local and state levels. At the local level, the sago peat swamp forest plays an important role in income contribution to the farmers. However, their attitudes towards the conservation and maintenance of the sago peat swamp forest have to change towards sustainability for perpetual benefits. At the state level, sustainability needs proactive management to make the sago peat swamp forest more productive by implementing environmentally friendly projects that generate income for the benefit of the stakeholders.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**PENILAIAN EKONOMI KE ATAS REJIM PENUAIAN
DALAM HUTAN SAGU**

Oleh

SULAIMAN HJ HUSAINI

Januari 2006

Pengerusi: Profesor Khalid Abdul Rahim, PhD

Fakulti: Ekonomi dan Pengurusan

Persepsi bahawa tanah gambut adalah tanah pinggiran dan sagu adalah tanaman pinggiran juga adalah satu kenyataan yang kurang tepat. Kenyataan ini tidak mengambilkira kos alam sekitar dan keuntungan yang terdapat dari pengurusan hutan paya sagu. Hutan paya sagu memainkan fungsi yang penting dalam ekologi dan alam sekitar, dan juga ia memberi keuntungan yang berterusan sekiranya diurus dengan cara lestari. Satu daripada cara untuk mengukur kelestarian adalah menilai sumber alam. Kajian ini menggunakan disiplin ekonomi untuk mendapat satu set nilai. Dengan itu pendekatan yang digunakan ialah, pendekatan Penilaian Ekonomi Menyeluruh (TEV). Untuk menunjukkan TEV, komponen-komponen hutan paya sagu akan dianggarkan dan dikuantifikasikan iaitu nilai batang sagu, ikan, air, sekuestrasi karbon dan hidupan liar. Cara yang digunakan untuk penilaian segala keuntungan ini adalah menggunakan harga pasaran, pendekatan mengelak kos kerosakan dan cara penilaian kontinjen.

Objektif kajian ini adalah untuk menganggarkan TEV rejim penuaian sagu yang efisien dari segi kewangan dan alam sekitar. Sampel yang diambil adalah ketua isi rumah daripada kampung-kampung yang berdekatan dengan tempat kajian. Ini

adalah untuk memastikan sample tersebut mempunyai hubungan rapat dengan tempat kajian. Kajian ini adalah dianalisis dalam tiga bahagian. Bahagian pertama adalah Kesanggupan-Untuk-Membayar (WTP) faedah-feadah yang diperolehi daripada hutan paya sagu di Mukah. Analisa ini telah menunjukkan bahawa WTP adalah dipengaruhi oleh pendapatan yang diperolehi daripada faedah-faedah tersebut. Bahagian kedua adalah untuk mengkuantifikasikan tiap-tiap komponen TEV yang digunakan dalam kajian ini. Analisa telah menunjukkan bahawa nilai di bawah opsyen lestari adalah tinggi daripada nilai opsyen yang tidak lestari. Bahagian yang terakhir membincangkan mengenai analisa kewangan. Kadar pulangan dalaman dan ekonomi telah diambilkira. Kadar pulangan dalaman kewangan hanya mengambilkira nilai pokok sago. Tetapi, kadar pulangan dalaman ekonomi mengambil kira semua faedah-faedah yang terdapat dalam hutan paya ke dalam pengiraan kewangan. Nilai faedah-faedah ini telah disatukan untuk mendapat nilai yang lebih sempurna.

Keputusan adalah signifikan bagi peringkat tempatan dan peringkat negeri. Di peringkat tempatan, hutan paya sagu memainkan peranan dalam menyumbang pendapatan kepada petani. Walau bagaimanapun, tabiat para petani terhadap pemuliharaan dan menyelenggara hutan paya sagu harus ditukar kepada lestari untuk keuntungan yang berpanjangan. Di peringkat negeri, lestari menghendaki pengurusan yang proaktif untuk memberikan hutan paya sagu lebih produktif dengan melaksanakan projek yang mesra alam yang akan menjana pendapatan untuk keuntungan pemegang taruh.

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I certify that an Examination Committee met on 3th January 2006 to conduct the final examination of Sulaiman Hj. Husaini on his Doctor of Philosophy thesis entitled "An Economic Valuation of Sago Forest Harvesting Regimes" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

Muzafar Shah Habibullah, PhD

Professor
Faculty of Economic and Management
Universiti Putra Malaysia
(Chairman)

Mad Nasir Shamsudin, PhD

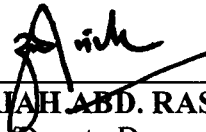
Professor
Faculty of Environmental Studies
Universiti Putra Malaysia
(Internal Examiner)

Tai Shzee Yew, PhD

Associate Professor
Faculty of Economic and Management
Universiti Putra Malaysia
(Internal Examiner)

Tridoyo Kusumastanto, PhD

Professor
Faculty of Fisheries and Marine Sciences
Bagor Agricultural University, Indonesia
(External Examiner)



ZAKARIAH ABD. RASHID, PhD
Professor/Deputy Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: **16 FEB 2006**

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirements for the degree of Doctor of Philosophy. The members of the Supervisory Committee are as follows:

Khalid bin Abdul Rahim, PhD
Professor
Faculty of Economics and Management
Universiti Putra Malaysia
(Chairman)

Ahmad Shuib, PhD
Associate Professor
Faculty of Economics and Management
Universiti Putra Malaysia
(Member)

Abu Hassan Md Esa, PhD
Professor
Curtin University, Miri
(Member)



AINI IDERIS, PhD
Professor/Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 09 MAR 2006

DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.



SULAIMAN HAJI HUSAINI

Date: 10 February 2006

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LIST OF ABBREVIATIONS

BOD	Biological Oxygen Demand
CBA	cost benefit analysis
cm	centimeter
CO₂	carbon dioxide
COD	Chemical Oxygen Demand
CRAUN	Crop Research and Application Unit
CS	compensating Surplus
Ct	carbon tonne
CV	compensating variation
CVM	contingent valuation method
DID	Department of Irrigation and Drainage
EC	electrical conductivity
EIA	environmental impact assessment
EIRR	economic internal rate of return
EMS	environmental management system
EQA	Environmental Quality Act, 1974
ES	equivalent surplus
EV	equivalent variation
FIRR	financial internal rate of return
GDP	gross domestic product
GNP	gross national product
ha	hectare
ICZM	Integrated Coastal Zone Management
ITTO	International Tropical Timber Organisation

kg	kilogram
LAI	leaf area index
LAWOO	Land and Water Research Centre, University of Wiganigen, Netherlands
LCDA	Land Custody and Development Authority
m	meter
m ²	meter square
m ³	cubic meter
me	milli equivalent
mg/l	milligram per litre
MWL	mean water level
NAP3	Third National Agriculture Policy
NDP	National Development Policy
NGO	non-government organization
NOAA	National Oceanic and Atmospheric Administration
NPV	net present value
NRC	National Research Council
NVP	National Vision Policy
OPP2	Second Outline Perspective Plan 1991 – 2000
OPP3	Third Outline Perspective Plan, 2000 – 2010
RM	Malaysian currency in ringgit
t	tonne
TDS	total dissolved solids
TEV	total economic value
TSS	total suspended solids

WTA	willingness-to-accept
WTP	willingness-to-pay

CHAPTER 1

INTRODUCTION

The notion that peat swamp land is a marginal land and sago is a marginal crop is an understatement. This understatement does not help the development of the communities which derive their income from sago farm. Further, such a notion omits the environmental costs and benefits associated with sago forest management options resulting in project evaluations and policy prescriptions that are less than socially optimal.

Forests serve important ecological and environmental functions and provide an important resource base, if they are managed in a sustainable manner. Sustainable sago forest management can provide a reliable source of income and subsistence products. Some of these benefits are obvious to the community, while others are either not well understood or are just taken for granted. Some of these benefits accrue through the provision of environmental amenities, and some are intimately linked to the economic system. These relationships between economic development and the environment have been stated clearly by the Bruntland Report (WCED 1987), which states:

“Environment and development are not separate challenges; they are inexorably linked. Development cannot subsist upon a deteriorating environmental resource base; the environment cannot be protected when growth leaves out of account the cost of environmental destruction. They are linked in a complex system of cause and effect”.

Excessive harvesting of forest products increases the water runoff that leads to accelerated level of soil erosion, further leading to the siltation of rivers. Our study